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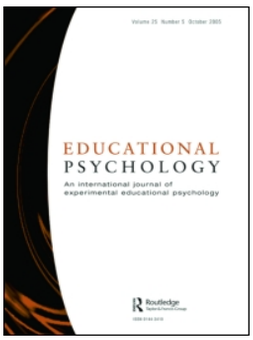

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ABSTRACT

The self-reported grades Dutch, English and Math of 13,970 students in the third grade of Dutch secondary education (US grade 9) were investigated with regard to educational track-level and dominant achievement goal (DAG). The performance approach goal group scored significantly higher on all three subjects than the performance avoidance group, the mastery approach group, the mastery avoidance group and the group without a DAG. In addition, the differences between the performance approach group and the other groups with regard to the three school subjects were of the same size, suggesting that the DAG is associated with the same processes across various school subjects. The magnitude of the differences between the other DAG groups, however, decreased with decreasing track level, suggesting that the DAGs' adaptive value varies systematically with ability level.

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Motivation; achievement goal; academic outcomes; secondary education

Introduction

The main purpose of this study was to explore the relation of students' dominant achievement goals (DAG) with academic outcomes in a tracked system for secondary education. Although the achievement goal approach has become increasingly important in clarifying motivational processes (Kaplan & Maehr, 2006), resulting in several hundreds of research papers and dozens of reviews and meta-analyses, it has hardly been investigated with regard to tracked educational systems. This is remarkable because tracking is a common feature of secondary and tertiary education systems in many countries, such as the systems of France, Germany, the Netherlands and the Russian Federation. Scheltinga, Kuyper, Timmermans, and van der Werf (2015) found systematic differences in DAG adoption at different tracks, which might result in systematic differences in academic outcomes as well. It may very well be that the adaptive value of achievement goals varies with ability level and therefore varies across tracks, which, of course, could have implications for educational practice. The current study therefore focuses on the following question: Does the association of the DAG and academic outcomes vary across tracks? Moreover, as the research regarding the impact of achievement goals on different school subjects is very scarce, we were interested in the following question as well: Does the association of the DAG and academic outcomes vary across different school subjects? In order to answer these questions, we studied students' DAG and self-reported grades on three school subjects in a large panel study in the Netherlands, i.e. COOL$^{5-18}$. Our study is, as a consequence of the paucity of research on DAG or on achievement goals in relation to track, exploratory in nature.

In the following overview of the literature, we will focus on (1) the achievement goal approach, (2) the association between achievement goals and academic outcomes of students in general, (3) the

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dominant achievement goal approach, (4) the consistency of the association between achievement goals and academic outcomes for various subjects in secondary education, and (5) achievement goals in tracked educational systems.

The achievement goal approach

In the last three decades, a growing body of evidence shows the importance of achievement goals in clarifying motivational processes. Very influential within the achievement goal approach is Elliot and McGregor's 2 × 2 achievement goal framework (2001) which postulates two dimensions, namely *definition* and *valence*. The dimension *definition* bifurcates the convictions persons have about what constitutes competence. If competence is defined as doing well relative to others, the resulting goal is called a *performance goal*. If, on the other hand, competence is defined as doing well relative to self-referenced standards or task requirements, the resulting goal is called a *mastery goal*. The dimension *valence* comprises the person's valence regarding the goal. A focus towards success or positive consequences is called an *approach goal*, and a focus away from failure or negative consequences is called an *avoidance goal*. Combining both dimensions yields four types of goals: performance-approach goals, performance-avoidance goals, mastery-approach goals and mastery-avoidance goals. Readers interested in the history of achievement goal theory are encouraged to consult Elliot (2005).

Meta-analyses of achievement goal research in various domains of life show the four achievement goals to have clearly different characteristics. Performance-approach goals are, generally, positively related to need for achievement (but less strongly so than mastery-approach goals), perceived competence (but less strongly so than mastery-approach goals) and competitiveness (Baranik, Stanley, Bynum, & Lance, 2010). Performance-avoidance goals are, generally, positively related to competitiveness (although less strongly so than performance-approach goals) and negative affect, but negatively related to help seeking, positive affect, perceived competence, cognitive ability (Baranik et al., 2010), self-evaluation and self-reactions (Cellar et al., 2010). Mastery-approach goals are, generally, positively related to interest, need for achievement, perceived competence, positive affect, help seeking (Baranik et al., 2010), self-monitoring and self-evaluation (Cellar et al., 2010). Mastery-avoidance goals are, generally, positively related to negative affect and negatively related to cognitive ability and help seeking (Baranik et al., 2010).

Achievement goal and academic outcomes

In the last decades, two patterns have emerged in the literature concerning the relation between achievement goals and academic outcomes. One pattern consists of positive relations between both performance-approach and mastery-approach goals with academic outcomes. This pattern of relations was found, for instance, by Daniels et al. (2008) and in the meta-analyses by Baranik et al. (2010) and by Cellar et al. (2010). Baranik et al. (2010), for example, found that the correlation between academic outcomes (i.e. grade point average, exam performance or performance on math-related tasks) and mastery-approach, and between academic outcomes and performance-approach goals was .10 and .13, respectively. The second pattern consists of a positive relation between performance-approach and academic outcomes in combination with a null relation between mastery-approach goals and academic outcomes (Barron & Harackiewicz, 2001; Elliot & McGregor, 2001; Elliot & Murayama, 2008; Harackiewicz, Durik, Barron, Linnenbrink-Garcia, & Tauer, 2008; Senko & Harackiewicz, 2005; Senko, Hulleman, & Harackiewicz, 2011; Senko & Miles, 2008). In both patterns, performance-avoidance goals are negatively related to academic outcomes (Murayama & Elliot, 2012), while mastery-avoidance goals are slightly negatively or uncorrelated to academic outcomes (Baranik et al., 2010), and, furthermore, in both patterns, the correlations are weak at best.

Blaga (2012), Huang (2012) and Hulleman, Schrager, Bodmann, and Harackiewicz (2010) suggest on the basis of their meta-analyses that the different patterns stem from different operationalisations of the achievement goals. We will illustrate this by giving two examples taken from the comprehensive

analysis by Hulleman et al. (2010). The first example concerns performance-approach goal scale items. If performance-approach goal scale items are normatively framed (e.g. 'I try to do better in my courses than other students') and do not hint at evaluative aspects, then these goals correlate on average .14 with academic outcomes. If performance-approach goal scale items focus on evaluative aspects (e.g. '…that the teacher thinks I am the best student', '… that others think I am smart'), then these goals correlate –.14 with academic outcomes. The second example concerns mastery-approach goal scale items. A scale item was categorised by Hulleman et al. (2010) as *mastery-approach* if it contained goal-related language (e.g. 'The main reason I study is ….'), referred to learning, improving or mastering (e.g. 'I strive to constantly learn and improve in my courses.') and was framed in an approach manner (e.g. 'The opportunity to do challenging work is important to me'). Under these criteria, the correlation between mastery-approach scales and academic outcomes *declines* from .14 to .05, if the proportion of *mastery-approach* items grows.

Hulleman et al. (2010) conclude that similar labels ('performance approach goals' or 'mastery approach goals') are applied to essentially different constructs. Therefore, we deem it necessary to explain the concept of the DAG and the associated instrument in greater detail further below.

The dominant achievement goal

To assess achievement goals in educational settings, generally a few Likert-type survey items are used to measure each goal, which results in an individual score on all achievement goals. Widely used instruments constructed in that manner are the Patterns of Adaptive Learning Scale (Midgley et al., 2000) and the Achievement Goal Questionnaire-Revised (Elliot & Murayama, 2008). An alternative approach is to identify a person's dominant achievement goal (DAG), because in a specific context, persons tend to prefer one particular achievement goal over the other goals (Van Yperen, 2006). Generally, about 85% of the secondary school students have a DAG (Scheltinga et al., 2015). It has been found that individuals with different DAGs have distinct profiles which, generally, are in line with the extant empirical data concerning the traditional achievement goal approach (e.g. de Lange, Van Yperen, Van der Heijden, & Bal, 2010; Van Yperen, 2006). Clearly, the emphasis on the dominant achievement goal does not exclude the possibility of persons pursuing multiple goals simultaneously. Indeed, Van Yperen (2006) and Van Yperen and Orehek (2013) found that persons with a dominant performance-approach goal pursued the other three goals as well. In addition, persons with a dominant avoidance goal (be it performance or be it mastery) pursued the other avoidance goal to a large extent as well.[1] However, as a consequence of the classification in a DAG group the intensity of the student's goal pursuit is lost which might dilute the association between the goal group and the various variables.

The DAG approach is similar to goal induction in experimental research, which makes it more straightforward to compare results over methods (Van Yperen, 2006). Indeed, in experimental research, a person's assigned or freely adopted achievement goal is assumed to be the dominant achievement goal in that setting. In the DAG approach, as in the experimental approach, the different achievement goals are examined as variables that vary between persons (Van Yperen, 2006). In contrast, in the survey approach, each person receives a score upon each achievement goal, and thus the individuals' achievement goals are examined as within-subject variables. Hence, an advantage of the DAG approach is, that 'goal origin (personally adopted vs. assigned), operationalisation (continuous vs. categorical), and method (correlational vs. comparing group means) are not confounded, allowing possible differences in results to be explained more unequivocally in terms of goal origin' (Van Yperen, 2006, p. 1433).

The instrument we used to measure the DAG preferred achievement goal was introduced by Van Yperen (2006). This instrument consists of performance-approach and performance-avoidance items that are normatively framed and of mastery-approach and mastery-avoidance items that refer to improving; hence this instrument should generate results that are in line with the second pattern of results concerning achievement goals and academic outcomes described above. Further details regarding our instrument are given in the method section below.[2] To date, five publications using the DAG approach are available, viz. Van Yperen (2006), de Lange et al. (2010), Van Yperen, Hamstra, and van der Klauw

(2011), Van Yperen and Orehek (2013) and Scheltinga et al. (2015). However, in only one publication results concerning the association between DAG and academic outcomes were presented. Van Yperen (2006) compared the final course grades of 109 sophomore and 170 junior students from various science majors to compare the means of the various DAG groups. Students with dominant performance avoidance goals had a lower mean grade, but only relative to students with dominant performance approach goals. Differences with and between other DAG groups did not reach statistical significance (Van Yperen, 2006).

Achievement goals and school subjects

Although much work has been done regarding achievement goals and academic outcomes, which has usually been measured as grade point average, final exam scores, performance on specific exams, and class performance as assessed by teachers (Blaga, 2012), relatively little work has been done regarding the effect of achievement goals upon different school subjects. Bong (2004) performed factor analysis on various motivation-related measures, *inter alia* mastery, performance-approach and performance-avoidance goals, and subsequently associated the resulting latent factors with general school learning and the school subjects Korean, English and Mathematics. The performance-approach and performance-avoidance goals showed strong correlation across school subjects and general school learning, whereas mastery goals were only moderately correlated across these areas, which suggests that mastery goals are subject-specific while performance goals generalise across several subjects. Ho and Hau (2008), found in a sample of 1950 seventh-grade Hong Kong Chinese students that the achievement in the school subjects mathematics and English had small positive relations to both mastery goals and performance approach goals, but a small negative relation to performance avoidance goals. In contrast, Tang (n.d.), distinguishing performance goals and learning (mastery) goals in a sample of 396 Taiwanese 8 graders, found that learning Mathematics was promoted by performance goals, contrary to learning Language Art, where mastery goals proved to be beneficial instead. These last results suggest that achievement goals may differ in impact upon various school subjects.

A different perspective was taken by Sparfeldt, Buch, Wirthwein, and Rost (2007), who looked at the school subjects Math, Physics, Chemistry, German Language, English Language and History, and found subject specific goal orientations (i.e. mastery goals, performance approach goals, performance avoidance goals and work avoidance goals) for each school subject in a sample of 1210 students from grades 7 to 10. Within each school subject, however, a similar pattern of relations between goal and academic outcomes was found: mastery goals and performance approach goals correlated moderately positive, work avoidance goals moderately negative, and performance avoidance goals did not correlate with grades, respectively.

Tracked systems and achievement goals

Many countries, for instance France, Germany, Greece, Italy, the Netherlands and the Russian Federation have tracked educational systems. However, studies on the relations between educational tracks and achievement goals are scarce. To our knowledge, Paulick (2011), Paulick, Watermann, and Nückles (2013) and Scheltinga et al. (2015) are the only publications on this subject. In the context of the German educational system with three ordered tracks, Paulick (2011) and Paulick et al. (2013) using a three-goal model (i.e. performance-approach goals, performance-avoidance goals and mastery-approach goals) found the associations within each track between achievement goals and academic outcomes were weak at best. However, academic outcomes were negatively predicted by performance-approach goals in the highest track only but positively predicted in all tracks by mastery-approach goals (Paulick et al., 2013), which suggests that achievement goals may impact academic outcomes differently per track.

Although it does not concern a genuine tracked system, the study by Simzar, Domina, and Tran (2016) regarding achievement goal changes for eighth-grade students placed in higher (algebra) and lower (general mathematics) courses in California (USA), is of interest here as well. Students in the

algebra course showed, compared to students in the general mathematics courses, higher levels of performance-avoidance goals. In addition, students that were high achieving in mathematics prior to placement in the algebra course showed higher levels of mastery and performance-approach goals than the other students, regardless of the course they were in. The authors suggest that high-achieving students may experience motivational benefits as a consequence of being placed in a higher course while it may harm the motivation of average- and low-performing students (Simzar et al., 2016).

In the context of the Dutch secondary educational system with five ordered tracks, Scheltinga et al. (2015) found a remarkably regular shift in prevalence pattern of the DAGs across tracks; both approach goals and the group without a DAG did become less, while both avoidance goals did become more prevalent in higher tracks, respectively. In addition, the changes along the valence dimension were far more pronounced than those along the definition dimension; the prevalence of the approach and of the performance goals decreased to 44.4% and 7.6%, respectively. The relation DAG – academic outcomes was not part of that study.

The present research

The present research is based upon data gathered in Dutch secondary education, which is compulsory until age 18 and which is, furthermore, highly tracked. Track A prepares students for university; track B provides general education and gives access to higher professional education. Tracks C, D, and E offer prevocational education at advanced, middle, and basic levels, respectively, and give access to senior secondary vocational education. Although the influence of social background on track choice is relatively weak (Contini & Scagni, 2010), children from higher educated backgrounds gain higher diplomas after ability has been controlled for (Tieben & Wolbers, 2010).

With regard to the association of DAG and Track we expect, based upon our review of the extant literature above, (1) the performance approach group to be positively associated with academic outcomes, especially in higher tracks, (2) the performance avoidance group to be negatively associated with academic outcomes, especially in higher tracks, and (3) the mastery approach group to be unrelated to academic outcomes regardless of track. In addition, with regard to the association of DAG and school subjects, we expect, (4) the performance approach group to show the highest mean on all school subjects, (5) the means of the performance approach group to be virtually identical on the three school subjects, (6) the performance avoidance group to show the humblest mean on all school subjects and (7) the means of the performance avoidance group to be virtually identical on the three school subjects.

Method

Procedure

We made use of student questionnaire data from the third year of secondary education (equivalent to US grade 9) concerning DAG, track, and grades on the school subjects Dutch Language, English Language and Mathematics, gender, intelligence and self-efficacy. These data were gathered in the first months of 2011 by the Groningen Institute for Educational Research (GION), a department of Groningen University, in the context of the COOL$^{5-18}$ project, which is dedicated to children's school career from ages 5 to 18. Administrative data were provided by the schools and authorization for the collection and analysis of the data was given by the students' parents. For further information, we refer to the COOL$^{5-18}$ website.[3]

Participants

The total sample for participation in the student questionnaire was 15,035 students in grade nine of Dutch secondary education (approximately age 15), spread over 134 schools. We excluded 1065 students from our analyses because they (a) did not fill in their gender (124), (b) did not complete the DAG instrument (618), (c) their educational track was unknown (290), or (d) their school class identification was

Table 1. Sample (S) data and comparison with population (P).

	Sample (S)		Population (P)		Difference
Track	*N*	%	*N*	%	S–P
A	3863	27.7	41,858	23.8	+3.9
B	3968	28.4	38,234	21.8	+6.6
C	3450	24.7	49,106	27.9	−3.2
D	1618	11.6	26,637	15.2	−3.6
E	1071	7.7	19,932	11.3	−3.6
total	13,970	100.1	175,767	100.0	.1

missing (53). This reduced the sample size to 13,970 students, spread over 897 classes in 129 schools. In Table 1, our sample is compared with nationwide population data. It is clear that, in our sample, students in tracks C, D and E were under-represented and students in the higher tracks, especially track B, were over-represented. As a consequence, we had to be cautious in interpreting results of overall analyses.

Variables

Of focal interest in this study were the criterion variables *student achievement in Dutch Language, English Language* and *Mathematics* and the predictor variables *Dominant Achievement Goal* and *School Track*. Gender, IQ and Self-Efficacy functioned as covariates in the analyses of student achievement. Gender plays a minor role in achievement goal theory in general, (e.g. Gherasim, Butnaru, & Mairean, 2012; Nie & Liem, 2013), but in the context of DAG research Scheltinga et al. (2015) found girls to have a lower prevalence of both approach goals. IQ was used as a covariate because prior cognitive ability has been found to be differently related to achievement goal adoption (Baranik et al., 2010; Senko et al., 2011). Lastly, self-efficacy is regarded as an antecedent of achievement goal adoption; high self-efficacious persons tend to adopt approach goals (Cellar et al., 2010; Elliot, 2005; Elliot & McGregor, 2001). The variables and their instrumentation are discussed below.

Grades Dutch Language, English Language and Mathematics

Dutch grades range from 1 to 10, one decimal being allowed. Generally, a student receives three times per year a 'school report' with grades for all subjects. These grades are typically based on several tests and other assessments during the lessons. In the student questionnaire, the question *What was the grade on your last school report for these subjects? NB: Whole digits in the first box, decimals in the second box*. was included under which was printed 1. Dutch, 2. English, 3. Mathematics, each followed by two boxes in which the students could mark their grades in one decimal. As no other school grades were requested, we had to limit our study to these subjects.

Dominant achievement goal

To determine the DAG, the method introduced by Van Yperen (2006) was used; see Table 2. The instrument presents the student with six pairs of propositions in which the achievement goals are pitted against each other. Following the stem *This year, I find it most important in school …* the student has to choose between two statements indicating different achievement goals, e.g. *to get higher grades than to which I am normally capable* or *not to get lower grades than most of my classmates*. The performance-approach goal was represented by *to get higher grades than most of my classmates,* whereas *not to get lower grades than most of my classmates* indicated the performance-avoidance goal. The mastery-approach goal was represented by *to get higher grades than to which I am normally capable and* the mastery-avoidance goal by *not to get lower grades than to which I am normally capable*. Each goal is part of three relevant contrasts.

If a student picks the same goal thrice, that goal is supposed to be that student's DAG; students that do not consistently prefer a particular goal are classified as not having a DAG. The classification of this

Table 2. The instrument used to determine the Dominant Achievement Goal (DAG) in 2011.

For each item, choose either A or B			
This year, I find it most important *in school* …			
	A		B
(1)	to get *higher grades* than most of my classmates	òr	*not* to get *lower grades* than most of my classmates
(2)	to get *higher grades* than to which I am normally capable	òr	*not* to get *lower grades* than to which I am normally capable
(3)	to get *higher grades* than most of my classmates	òr	to get *higher grades* than to which I am normally capable
(4)	*not* to get *lower grades* than to which I am normally capable	òr	*not* to get *lower grades* than most of my classmates
(5)	*not* to get *lower grades* than most of my classmates	òr	to get *higher grades* than to which I am normally capable
(6)	*not* to get *lower grades* than to which I am normally capable	òr	to get *higher grades* than most of my classmates

latter group requires an answer on all six questions, hence students that do not answer all questions were excluded from the analyses. Students choosing, for instance, *not to get lower grades than most of my classmates* on all occasions were assigned to a dominant performance-avoidance goal, while students choosing thrice *to get higher grades than to which I am normally capable* were assigned to a dominant mastery-approach goal.

Track

Data on students' educational track were provided by the school administrations. Five educational tracks were distinguished; ordered from highest to lowest, A–E

Gender

Data on the participants' gender were provided by the schools.

We used 'boy' as the reference category which was coded as 0 while 'girl' was coded as 1.

IQ

In COOL$^{5-18}$, intelligence is measured by the Niet-Schoolse Cognitieve Capaciteiten Test [Non-Scholastic Cognitive Capacities Test], (Van Batenburg & Van der Werf, 2004), with a mean of 100 and a standard deviation of 15. Although this test consist of five subtests, for the purpose of this study, we used the score on the entire test, which had a stratified α of .91 (Zijsling, Keuning, Naayer, & Kuyper, 2012).

Self-efficacy

A six-item subscale of the Patterns of Adaptive Learning Scale (Midgley et al., 2000) was used to measure perceived self-efficacy. Cronbach's α for this scale was .83 (Zijsling et al., 2012); an example item is: *Even if the work is hard, I can learn it*.

The distributional characteristics of the variables are presented in Table 3.

Attrition

The 1065 students with missing values on either the DAG instrument, Gender, school class identification or the variable Track were not included in the analyses. Furthermore, Table 3 shows that not all students did report their grades on the three school subjects. Comparing the data of students involved in the analysis with that of students who were left out showed some attrition bias; there was a significant difference between the IQ scores (Cohen's $d = .17$, $t(13{,}762) = 4.79$, $p < .001$) and the Mathematics grades (Cohen's $d = .12$, $t(13{,}618) = 3.52$, $p < .001$) of the students in the analyses compared to the excluded students. Although significant, these differences may be qualified as constituting a near zero effect. Since effects of IQ on academic outcomes were taken into account in every analysis, this selectivity is minimised as

Table 3. Distributional characteristics.

	N	Min.	Max.	*M*	SD	%
Grade Dutch	13,768	.0	9.9	6.72	.95	
Grade English	13,757	.0	9.9	6.78	1.23	
Grade math	13,620	.0	9.9	6.68	1.37	
Gender (girl)	14,911					51.12
Self-efficacy	14,796	1.00	5.00	3.51	.65	
IQ	13,764	44.49	152.38	100.24	14.87	

much as possible. There was no attrition bias for the variables School Grade Dutch (Cohen's $d = -.05$, $t(13{,}766) = 1.58$, $p = .11$), School Grade English (Cohen's $d = .01$, $t(13{,}755) = .12$, $p = .90$, Gender (Cohen's $d = .03$, $\chi^2(1, N = 14{,}911) = 4.12$, $p = .04$) and Self-Efficacy (Cohen's $d = -.03$, $t(14{,}794) = 1.27$, $p = .21$).

Analytic strategy

The data were analysed using three-level multilevel multivariate models (Snijders & Bosker, 2012) because the self-reported grades Dutch, English and Mathematics are nested in students (level 1), classes (level 2) and schools (level 3) and ignoring the nested structure data might have led to an overestimation of statistical significance as a result of underestimated standard errors of the regression coefficients. For all models, the MLwiN 2.29 software (Rabasch, Charlton, Browne, Healy, & Cameron, 2009) was used.

First, a multivariate unconditional model (Model 1) with Grade Dutch, Grade English and Grade Math as dependent variables was estimated to establish whether our data justified the use of multi-level multivariate analyses, i.e. whether there was a significant amount of variance/covariance at the class and school level. The significance of the variance/covariance components on school and class level can be determined by evaluating the ratio of the estimated coefficient and the associated standard error against the standard normal distribution. The ratio of the between-cluster variance to the total variance, the Intraclass Correlation (ICC) indicates the part of the total variance in the School Grades accounted for by the school and the school + class level. The ICC may be interpreted as the correlation among observations within the same level, e.g. classes within schools or pupils within a class.

Second, we included Sex, IQ and Self-Efficacy, in that order, as covariates (Model 2). In this and subsequent models, we applied centring around the class mean at student level, centring around the school mean at class level and centring around the grand mean at school level to the variables IQ and Self-Efficacy, thus following the recommendations of Enders and Tofighi (2007) regarding level 1 predictors as object of primary interest. Subsequently, we added DAG and Track to estimate their influence beyond that of the student characteristics (Model 3). We used the NDAG group as the reference category when adding the DAG because the characteristics of the other groups are the tenets of achievement goal research and, furthermore, the NDAG group generally is considered not to have a specific profile. For the addition of the variable Track the basic level pre-vocational training track E, being the academically least challenging track and hence being a natural starting point for comparison, was used as reference category. Finally, we added the interaction of DAG and Track to examine whether the DAG exerts a comparable influence across tracks (Model 4).

Results

The prevalence of the DAG

In our sample of 13,970 grade nine students, 11,494 students (82.3%) had a DAG; consequently the other 2476 students (17.7%) could be classified as NDAG. The most common DAG was the mastery avoidance goal (45.5%), followed by the mastery approach goal (21.3%), while the performance avoidance goal group (10.0%) and the performance approach goal group (5.4%) were much smaller. Table S1 of the Supplementary Files gives the distribution of the DAG across Tracks and Gender.

Grades Dutch, English and Math in the Unconditional Model

Model 1, the unconditional model, showed that the average school grades on the school subjects Dutch (6.7), English (6.8) and Mathematics (6.7) are approximately the same. Moreover, see Table 4, Model 1 revealed that there are significant amounts of variance and covariance on school, class and student level. On all three levels factors operate that are associated with differences in grades and on all three levels the variance in grades between the three school subjects is correlated. The ICC(school) for Grade Dutch, Grade English and Grade Math are .05, .04 and .06, respectively and, in the same order the ICC(school + class) are .19, .17 and .15; this indicates that the school grades tend to resemble each other to a little degree per school and to a somewhat larger degree per class. Table 4 displays the correlations of the three school grades on the three levels below the diagonal; in general, these correlations can be qualified as moderate. On all levels, the correlation between Dutch and English (.44, .37, and .32 on school, class, and student level, respectively) is stronger than the correlation between Dutch and Math (.28, .24 and .29). Furthermore, on class and on student level the correlation between English and Dutch is stronger than the correlation between English and Math (.28 and .13). Thus, these languages seem to have more in common with each other than with Math. In addition, on the student level, the correlation between Math and Dutch is stronger than the correlation between Math and English. The forces operating at the different levels seem to affect the three school subjects differently.

Grades Dutch, English and Math, and Student Characteristics, DAG and Track

The results of Models 2 and 3 are summarised in Table 5. In Model 2, the student characteristics Gender, IQ and Self-Efficacy were, in that order, added to the unconditional model. Each added variable resulted in a significantly better model fit; the associated values for the difference in −2*log-likelihood between Model 1 and Model 2 are $\chi^2(9, N = 11{,}925)=2448.39$, $p < .001$. Being a girl is associated, in this model, with a .4 higher Grade Dutch, with a very modestly (i.e. .1) higher Grade English and with a non-significant difference (i.e. rounded in one decimal .0) regarding Grade Math. In contrast, higher scores on IQ and on Self-Efficacy are associated with higher grades on all three school subjects; especially on Math. For instance, a difference of one SD in IQ points is associated with differences in Grade Dutch, Grade English and Grade Math of .1, .1 and .4, respectively. Likewise, a difference of one SD in Self-Efficacy is associated with differences in Grade Dutch, Grade English and Grade Math of .2, .2 and .3, respectively.

Next, we estimated a model in order to examine whether DAG and Track were related to student academic outcomes after accounting for student characteristics; the results are given as Model 3 in the right part of Table 5. The variables DAG and Track were added to the model in that order. Each added variable resulted in a significantly better model fit; the associated values for the difference in −2*log-likelihood between Model 2 and Model 3 are $\chi^2(24, N = 11{,}925) = 289.89$, $p < .001$. As mentioned above, the reference category for the addition of the DAG was the NDAG group, meaning that the model shows the differences of the other DAG groups with the NDAG group. Likewise, we used track E (basic level pre-vocational education) as reference category for the addition of the variable Track.

Table 4. Variance-covariance matrix with S.E. and correlations (bold) for the random part of Model 1 on the three levels.

	Dutch	English	Math
School level			
Dutch	.044 (.010)	.023 (.009)	.019 (.011)
English	**.444**	.059 (.014)	.028 (.013)
Math	**.283**	**.362**	.105 (.021)
Class level			
Dutch	.129 (.010)	.059 (.009)	.035 (.009)
English	**.370**	.197 (.016)	.044 (.011)
Math	**.238**	**.282**	.176 (.016)
Student level			
Dutch	.722 (.009)	.306 (.009)	.310 (.010)
English	**.318**	1.281 (.016)	.193 (.013)
Math	**.287**	**.134**	1.617 (.021)

Table 5. Student characteristics, DAG, track and their effect on grades Dutch, English and Math.

	Model											
	2. Student Characteristics						3. Student Characteristics, DAG and Track[1]					
	Grade Dutch		Grade English		Grade Math		Grade Dutch		Grade English		Grade Math	
Fixed part	*β*	SE	*β*	SE	*β*	SE	*β*	SE	*β*	SE	*β*	SE
Characteristic												
Intercept	6.525***	.028	6.721***	.033	6.698***	.0039	6.605***	.054	6.501***	.067	6.895***	.076
Gender (girl)	.419***	.016	.095***	.022	−.023	.023	.416***	.016	.093***	.022	−.024	.024
IQ	.006***	.001	.005***	.001	.027***	.001	.006***	.001	.005***	.001	.027***	.001
Self-efficacy	.255***	.012	.308***	.017	.507***	.018	.246***	.013	.294***	.017	.495***	.019
Pap							.237***	.038	.249***	.052	.236***	.056
Pav							−.017	.030	−.030	.042	−.023	.045
Map							−.001	.025	−.014	.034	.014	.037
Mav							.043*	.022	−.021	.031	.013	.033
Track A							.064	.062	.577***	.076	.015	.084
Track B							−.278***	.061	.058	.075	−.288***	.083
Track C							−.188***	.058	.152*	.071	−.316***	.078
Track D							−.064	.055	.184**	.069	−.475***	.075
Random Part												
Variance at school level	.047***	.011	.058***	.014	.104***	.021	.045***	.010	.056***	.013	.097***	.020
Variance at class level	.136***	.010	.194***	.016	.191***	.016	.113***	.009	.145***	.013	.159***	.015
Variance at student level	.648***	.009	1.233***	.017	1.405***	.019	.646***	.009	1.123***	.017	1.403***	.019
Total variance	.831		1.488		1.700		.804		1.324		1.659	
ICC school	.057		.039		.061		.056		.042		.059	
ICC school +class	.220		.170		.174		.197		.152		.154	
Model Fit												
−2*loglikelihood:	102,698.388						102,408.500					
Number of schools	123						123					
Number of classes	834						834					
Number of students	11,925						11,925					

[a]In model 3 the group without a DAG serves as the reference group for the variable DAG and track E serves as the reference group for the variable Track.

*$p < .05$; **$p < .01$; ***$p < .001$.

Regarding the variable DAG, Model 3 shows that there are significantly higher scores on Grade Dutch, Grade English and Grade Math for the performance approach group (the differences being .24, .25 and .24, respectively) compared to the NDAG group. In addition, there is a modest but significant effect on Grade Dutch for the mastery avoidance group of .04 compared with the NDAG group, while the differences with the other goal groups do not reach significance.

In order to complete the picture, we estimated this model with the other DAG groups as reference categories as well. A summary of the results is given in Table S2 of the Supplementary Files; regardless of the group used as reference the performance approach group always has a significantly higher mean Grade Dutch, English and Grade Math. We found virtually identical differences of the performance approach group with the other goal groups: on Grade Dutch the range is .20 to .26, on Grade English the range is .25 to .27 and on Grade Math the range is .22 to .26. In addition, the mastery avoidance group has a slightly higher Grade Dutch than the other goal groups (aside from the performance approach group); these differences range from .04 to .06.

Regarding the variable Track, tracks B and C show significantly lower means (−.28 and −.19, respectively) on Grade Dutch than track E. A similar pattern was found with Grade Math; with the exception of track A all tracks have a significantly lower mean on Grade Math than track E; the differences being −.29 for track B, −.32 for track C and −.48 for track D, respectively. However, regarding Grade English the differences are all positive and significant (.58, .15 and .18 for track A, track C and track D, respectively); all tracks have a higher Grade English than track E. Finally, in Model 3 the covariance of Grade Math with Grade Dutch ($\beta = .01$, $SE = .01$) and of Grade Math with Grade English ($\beta = .01$, $SE = .01$) is insignificant at school level ($z = 1.20$, $p = .12$ and $z = 1.12$, $p = .26$, respectively).

Grades Dutch, English and Math, and DAG, Track and DAG-Track interaction

The results of our final model (Model 4), in which the interaction terms of the variables DAG and Track were added, are presented in Table 6. In Model 4, track E and the NDAG group were used as reference groups; adding the interaction terms led to an improvement in the model fit: $\chi^2(48, N = 11{,}925) = 78.20$, $p = .004$.

The positive association of the performance approach goal with the three school subjects, which ranged from .24 to .25 in Model 3, disappeared in Model 4. Indeed, all single DAG terms in Model 4 are small and statistically insignificant, implying that the overall effect of the DAG is the consequence of stronger effects in some and no effects in other tracks. In contrast, adding the interaction terms to the model did not alter much the relations of the variable Track with the three school subjects: track A has a significantly higher mean on Grade English (.50); tracks B and C have a significantly lower mean on Grade Dutch (of −.28 −.23, respectively) and Grade Math (of −.24 and −.42, respectively); track D has a higher mean on Grade English (of .22) but a lower mean on Grade Math (of −.53). Taken together this means that merely the significance of the higher mean on Grade English in track C when compared to track E disappears.

Four of the 48 interaction terms reach significance at .05 level; i.e. the interaction concerning Grade Dutch of the performance approach group with track A ($z = 2.56$, $p = .005$), the interactions concerning Grade English of the performance approach group with track A ($z = 2.07$, $p = .019$) and with track C ($z = 1.70$, $p = .045$) and the interaction of the mastery approach group with track B ($z = 1.81$, $p = .035$). A further three interaction terms reach significance at .10 level; two of these concern Grade English, i.e. the interaction of the performance approach group with track B ($z = 1.57$, $p = .058$) and the interaction of the performance avoidance group with track C ($z = -1.35$, $p = .089$). The last significant term concerns Grade Math, i.e. the interaction of track C and the mastery avoidance group with $z = 1.37$ and $p = .085$; of the seven significant coefficients five terms involve Grade English and one term is associated with each of the other school subjects. In the Supplementary Files, Table S3 displays the variance-covariance and correlation matrices of Models 2 and 4, respectively. Finally, to establish the differences per track per school subject across DAG groups, we used Model 4 to estimate the grades, after which we subtracted the smallest value per school subject per track; the results are presented in

Table 6. Student characteristics, DAG, track, DAG*Track and their effect on Grades Dutch, English and Math.

	Model					
	4. Student characteristics, DAG, track and DAG*Track[a]					
	Grade Dutch		Grade English		Grade Math	
Fixed Part	*β*	SE	*β*	SE	*β*	SE
Characteristic						
Intercept	6.603***	.067	6.545***	.086	6.926***	.096
Gender (girl)	.415***	.016	.090***	.022	−.026	.024
IQ	.006***	.001	.005***	.001	.027***	.001
Self-efficacy	.246***	.013	.293***	.017	.494***	.019
Pap	.074	.105	.050	.144	.192	.159
Pav	.042	.106	.033	.143	−.078	.156
Map	.081	.082	−.128	.112	.031	.124
Mav	.019	.084	−.027	.115	−.093	.127
Track A	.093	.085	.498***	.111	.054	.122
Track B	−.280***	.081	−.061	.104	−.238***	.115
Track C	−.229***	.077	.137	.101	−.420***	.109
Track D	.008	.078	.217*	.104	−.529***	.114
Pap*TrackA	.345**	.135	.383**	.185	.257	.202
Pap*TrackB	.158	.132	.285*	.181	.050	.198
Pap*TrackC	.171	.127	.295**	.174	.008	.190
Pap*TrackD	.044	.140	−.164	.192	−.161	.212
Pav*TrackA	−.099	.124	.057	.169	−.123	.182
Pav*TrackB	−.054	.120	−.020	.163	−.072	.177
Pav*TrackC	−.022	.121	−.222*	.164	.156	.179
Pav*TrackD	−.099	.134	−.020	.163	.156	.199
Map*TrackA	−.139	.100	.047	.137	−.128	.149
Map*TrackB	−.065	.095	.235**	.130	−.098	.142
Map*TrackC	−.037	.094	.105	.129	.111	.142
Map*TrackD	−.133	.104	.122	.142	.051	.157
Mav*TrackA	−.009	.097	.057	.133	.036	.146
Mav*TrackB	−.026	.093	−.094	.128	.065	.141
Mav*TrackC	−.099	.094	−.030	.129	.195*	.142
Mav*TrackD	−.066	.104	−.181	.143	.144	.158
Random Part						
Variance at school level	.044***	.010	.057***	.013	.097***	.020
Variance at class level	.113***	.009	.146***	.013	.159***	.015
Variance at student level	.645***	.009	1.227***	.016	1.400***	.019
Total variance	.802		1.430		1.656	
ICC school	.055		.040		.059	
ICC school +class	.196		.142		.155	
Model Fit						
−2*loglikelihood:			102,330.3014			
Number of schools	123					
Number of classes	834					
Number of students	11,925					

[a]In model 4 the group without a DAG serves as the reference group for the variable DAG and track E serves as the reference group for the variable Track.
*$p < .10$; **$p < .05$; ***$p < .001$.

Table 7. Regarding Grade Math in track C, for instance, one can see that the NDAG group showed the most modest and the Performance Approach group the highest average, while the difference between both groups is .2 on a ten point scale.

As can be seen, the performance approach group is strongly associated with the highest estimates on the three school subjects for most tracks, especially for the higher tracks; moreover, the differences taper off with decreasing track level. In Table S5 of the Supplementary Files, the zero-order correlations between our main variables are presented with regard to the performance-approach group and the aggregated other groups of Track A.

Table 7. Spread in Grades per track based on Model 4.

	a	b	c	d	e
Dutch					
Pap[a]	.477	.244	.245	.175	.074
Pav	.001	.000	.020	.000	.042
Map	.000	.028	.044	.005	.081
Mav	.068	.057	.118	.010	.019
ndag	.058	.012	.000	.057	.000
English					
Pap	.357	.335	.534	.094	.178
Pav	.174	.013	.000	.221	.161
Map	.113	.107	.166	.312	.000
Mav	.000	.067	.132	.000	.101
ndag	.084	.000	.189	.208	.128
Math					
Pap	.650	.309	.200	.031	.285
Pav	.000	.061	.078	.078	.015
Map	.104	.000	.142	.082	.124
Mav	.144	.039	.102	.051	.000
ndag	.201	.067	.000	.000	.093

[a]Per track and per subject the smallest predicted value was subtracted from the other predicted values.

Discussion

The main purpose of this study was to explore the relation of a student's DAG with academic outcomes in a tracked system for secondary education. More specifically, we wanted a) to study the association of the DAG with academic outcomes across tracks and b) to study the association of the DAG with academic outcomes across different school subjects. We will look at these questions in turn after a short account of the student characteristics Gender, IQ and Self-Efficacy. Gender, IQ and Self-Efficacy proved to have relevant and significant relations with the three school grades, the exceptions being the relations of Gender with Grade English and Grade Math, of which the former was not relevant and the latter relevant nor significant. Self-efficacy and IQ had stronger associations with Grades English and Math than with Grade Dutch. These results are in line with the findings of Haag and Götz (2012), who found in a German sample that students think of (a) Math that it is difficult, that one needs talent to get good grades and that the grade is important for school success, of (b) German language that it is relatively easy, that one does not really need talent to get good grades and that the grade is not very important for school success, and of (c) English language that it is relatively easy, that one does not need very much talent but that the grade is important for school success. The role of gender may be associated with the fact that girls are more inclined to exert effort than boys and are less prone to behavioural self-handicapping (Hirt & McCrea, 2009; McCrea, Hirt, & Milner, 2008).

The introduction of the variable Track led to puzzling results regarding the differences in grades across school subjects. Systematic changes with track E, the reference category, became apparent: all other tracks score higher on Grade English; furthermore, three tracks score lower on Grades Dutch and Math. We are not aware of generally accepted explanations for these findings. The first author taught Math in the lower regions of the Dutch educational system in an earlier stage of his career; there and then it was not unusual to give grades with a motivational intention to convince the pupils that they were able to get good grades on their own level. Our results concerning Grade Math are in accordance with such practices, and, to some extent, the results concerning Grade Dutch as well.

The association of the DAG with academic outcomes across school subjects yielded some puzzling results as well. The introduction of the DAG showed that the performance approach group has a .24 or .25 higher mean on the school Grades Dutch, English and Math, while the mastery avoidance group has a higher Grade Dutch than the other goal groups, but these last differences are more impressive in statistical significance than in magnitude. These results were obtained with the NDAG group as a

reference category. We expected the performance approach group to have the highest mean on all school subjects; our results indeed show strong support for that expectation. Furthermore, we expected similar means for the performance approach group on the three school subjects, and that expectation was fulfilled by our results as well. We expected, in contrast, the performance avoidance group to have the lowest means on the three school subjects, a hypothesis for which we did not find support. However, our expectation that the means of the performance avoidance group would be virtually identical on the three school subjects was confirmed. These last two facts both stem from the circumstance that in our sample only the performance approach group had significant and relevant associations with the school subjects.

Of fundamental interest is the question whether the association of the DAG with academic outcomes varies across tracks; our expectation being that the performance approach group would be positively associated with academic outcomes, especially in higher tracks. These expectations proved to be true. In tracks A, B and C, the performance approach group consistently shows the highest score and the magnitude of the difference tends to diminish in that order. In tracks D and E, the performance approach group has the highest score in three of the six instances; in addition, the differences in these tracks are small compared to the higher tracks. In summary one can say that *only* the performance approach group plays a significant role, notably in the higher tracks and most notably in track A. The adaptive value of the other dominant achievement goals with regard to school grades is rather constant across tracks, namely about zero. As a consequence, our expectations concerning a negative association and a null relation between academic outcomes and respectively the performance avoidance and mastery approach group were not confirmed.

The relevance of the previous findings for educational practice is further diminished by the fact that the prevalence of the performance approach group decreases from 10.1% in track E to 3.8% in tracks B and A. These results are in line with the results of Paulick (2011) and Paulick et al. (2013), who found in the tracked German school system relations between goals and academic outcomes that were weak at best, and with the conclusion of the meta-analysis of Huang (2012). Nevertheless, if the DAG instrument could be adapted so as to tap more adequately into the characteristics of the mastery goals of the 2×2 framework, research might show these goals to be more potent in higher tracks as well. In lower tracks achievement goals probably needs scaffolding to function properly, maybe because the experience with failure in learning has led to unwillingness to exert the needed effort. Moreover, as personal goal adoption is influenced by the student's perception of the classroom goal structure (Meece, Anderman, & Anderman, 2005; Murayama & Elliot, 2009; Schwinger & Stiensmeier-Pelster, 2011), it probably is a good idea to look at differences in classroom goal structures across tracks and to stimulate teachers to actively promote adaptive achievement goals. Furthermore, besides goal orientation (Sparfeldt et al., 2007), self-handicapping is school subject specific as well (Schwinger, 2013), which is another reason for teachers to actively instal adaptive goal structures.

Persons classified as performance approach indicate that this year they find it *most* important in school to get higher grades than most of their classmates. Furthermore, to them, that aspiration is more important than to get higher grades than to which they are normally capable *and* more important than not to get lower grades than to which they are normally capable *and*, finally, more important than not to get lower grades than most of their classmates. Thus, the time frame is a complete school year, while the grades refer to all school subjects and the comparison group encompasses the entire class; a student in the dominant performance approach group aims very high. In less intellectually challenging conditions, for instance in lower tracks, such an aspiration may seem easier to fulfil than in more challenging conditions, for instance in higher tracks. Moreover, in higher tracks the students probably have a lower academic self-concept as a consequence of the big-fish-little-pond effect (Marsh et al., 2008). Furthermore, the desire to get higher grades than most of the classmates implies a constant exposure to threats to one's self-esteem, which implies that only if you are very sure that you can succeed, you realistically can pursue that ambition. Thus, the students endorsing a dominant performance approach goal constitute a small but probably highly motivated group; Van Yperen (2006) and Scheltinga et al.

(2015) found them to score very high on a host of motivation related constructs. It may be that the DAG instrument does not succeed very well in tapping into the characteristics of the mastery goals, but it certainly succeeds in selecting a very potent performance approach group.

Strengths and limitations of the present study and suggestions for future research

Obviously, the size of our sample gives our results a solid basis. Furthermore, this is one of the very few studies dedicated to achievement goals across different tracks and the very first study that looked at the relation of the DAG with academic outcomes across tracks. Moreover, the use of multilevel modelling makes it very unlikely that the results we presented are inflated.

A weakness may be the use of students' self-reported school grades, as there is some evidence that performance oriented students, compared to mastery oriented students, are more inclined to cheat (Stephens & Gehlbach, 2007; Van Yperen et al., 2011), although we do not see the possible gain in misrepresenting school grades in an anonymous survey. In addition, a second weakness may be the use of the DAG instrument itself, because the nature of the forced choice method does not permit the computation of standard psychometric properties. Furthermore, the DAG instrument might, as a consequence of the forced choices, suggest a dichotomous view of reality to the respondents, although this effect has not been reported in any of the DAG studies to date. A third weakness lies in the fact that as a consequence of attrition bias, which constituted a near zero but nevertheless significant effect, the results concerning Grade Math should be interpreted with some caution.

A further limitation of our research is that, although we demonstrate that the grades on the three school subjects have significant amounts of variance (and covariance) on school level, class level and student level, we did not use variables on the other levels. There are nevertheless forces at play on higher levels that influence school grades besides track, achievement goal, gender, intelligence and self-efficacy. Among those forces are probably the dimensions *valence* and *definition* on both school and class level. Further research might look into the direct and cross-level effects of these dimensions on academic outcomes.

Furthermore, the difference in grades across tracks, which seems to be systematic but distinct per school subject, requires further research. In addition, there is abundant room for further studies in which the DAG questions are rephrased in terms of specific school subjects and/or specific time frames as school year, semester or month. Finally, although research has shown that mastery goals buffer students against self-handicapping (Deppe & Harackiewicz, 1996; Leondari & Gonida, 2007; Ntoumanis, Thøgersen-Ntoumani, & Smith, 2009), our results suggest that performance approach goals may do so as well, which is a promising idea to test experimentally.

Notes

1. Table S4 of the Supplementary Files gives Means and Standard Deviations of the extent to which each of the DAG groups in our sample pursues each goal of the 2×2 framework.
2. The authors wish to thank Nico van Yperen for providing the syntax of the DAG instrument.
3. The COOL$^{5-18}$ data are available via DANS (Data Archiving and Network Systems, The Netherlands, http://www.dans.knaw.nl/). We made use of data from the Secondary Education segment. Further information regarding COOL$^{5-18}$ may be found at http://www.cool5-18.nl.

Disclosure statement

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